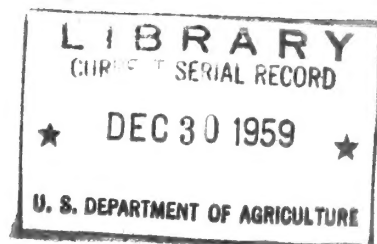


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CONTRIBUTIONS TOWARD A FLORA OF NEVADA

No. 47

SCROPHULARIACEAE OF NEVADA

PART II

THE GENERA EXCEPT MIMULUS AND PENSTEMON

by

Gabriel Edwin

- - -

November 16, 1959

A series prepared through the cooperation of
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Castilleja Sp.
Indian Paint Brush

Castilleja sp.
probably C. chromosa

From a painting by Helen Joslin
About 3/5 natural size

SCROPHULARIACEAE OF NEVADA

PART II

By Gabriel Edwin *

Contributions Toward a Flora of Nevada, No. 47

SCROPHULARIACEAE A. L. de Jussieu, Gen. Pl. 117. 1789.

Herbs, shrubs (rarely vines) with simple, alternate or opposite, exstipulate, petioled or sessile, entire, ciliate, toothed or pinnatifid leaves. Flowers perfect, paniculate, racemose or occasionally solitary. Inflorescences terminal or lateral. Sepals 5 or 4, distinct or united. Corolla 4-5-lobed, usually 2-lipped or rarely nearly regular, tubular, rotate or campanulate. Stamens usually 4, didynamous, sometimes 2, (5 in Verbascum). Carpels 2, with wholly joined ovaries, placentation axile, styles almost always united, stigmas either distinct or united. Capsule variously dehiscent, either septicidally or loculicidally, sometimes both, less often loculicidally by valves, ruptures or terminal porelike openings. Seeds few to many, winged or wingless, usually reticulate, endosperm fleshy.

A cosmopolitan family, with a very important center of speciation and distribution in western North America. About 200 genera and 3,000 species some of which are narcotic poisons. A number are saprophytic on roots.

Pollination usually is accomplished by insects; flowers sometimes cleistogamous.

Some are ornamentals of long standing, as "snapdragons" Latterly an increased use of "beard tongues" (Penstemon) and other genera has been noted.

A perplexing group especially as to family limits and the section Gratiolaeae.

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Key to Genera

1. Plants caulescent with leaves mostly or entirely alternate.
2. Corolla spurred or gibbous at base; calyx of 4 regular sepals, little if at all modified.
3. Antheriferous stamens 4.
 4. Capsule asymmetrical, anterior cell larger than the posterior, both opening by pores; corolla pouched at the base.
4. ANTIRRHINUM
 4. Capsule symmetrical, cells equal in size dehiscing the entire width.
 5. Corolla with a spur below and behind the lower lip.
2. LINARIA
 5. Corolla merely pouched at the base. 5. ASARINA
3. Antheriferous stamens 2. 3. MOHAVEA
2. Corolla not spurred nor gibbous at base; calyx of 5 regular or 4 highly modified sepals.
 6. Antheriferous stamens 5; flower structure little if at all modified; calyx of 5 more or less distinct sepals. . . 1. VERBASCUM
 6. Antheriferous stamens 4 or 2; flower structure highly modified; stamens and stigmas often enclosed by the upper lobe of the corolla and with its lips united into a distinct galea; calyx never more than 4-lobed.
 7. Cells of the anthers all equally placed (points of attachment to filament at ends of locules) and not reduced nor lacking. 16. PEDICULARIS
 7. Anthers not equally placed one attached medianly the other terminally; or anthers reduced, or lacking.
 8. Calyx cleft laterally into at least 2 lobes these sometimes cleft into 2 more, the fifth division entirely lost.
 9. Upper lip of the corolla little exceeding the lower in length or the lips subequal, lower mostly much inflated; bracts only rarely showy. 15. ORTHOCARPUS
 9. Upper lip of the corolla much exceeding the lower in length only rarely subequal, if subequal not inflated; bracts showy. 13. CASTILLEJA

8. Calyx cleft almost or entirely to the base below, remaining in 1 lobe with a dorsal projection, which may or may not be slightly bifid at the apex. . . . 14. CORDYLANTHUS
1. Plants caulescent with leaves mostly or entirely opposite; or plants scapose or acaulescent, leaves in a basal rosette.
 10. Scapose or acaulescent plants with leaves forming a basal rosette.
 11. Aquatic; leaves in a basal rosette; plants acaulescent; anthers 4. 10. LIMOSELLA
 11. Dry habitats; leaves radical; scape with scale leaves below the inflorescence; anthers 2. 12. SYNTHYRIS
 10. Plants caulescent with mostly or entirely opposite leaves.
 12. Stigmas wholly united, capitate or punctiform.
 13. Corolla rotate, tube very short, not gibbous nor spurred at the base, anther bearing stamens 2; or corolla papilionaceous, gibbous or spurred at the base, anther bearing stamens 4; capsule wholly or primarily loculicidal; no sterile filament present.
 14. Corolla rotate, not gibbous nor spurred at the base; antheriferous stamens 2. 11. VERONICA
 14. Corolla papilionaceous, gibbous or spurred at the base; antheriferous stamens 4. 6. COLLINSIA
 13. Corolla 2-lipped, neither rotate nor papilionaceous; capsule wholly or primarily septicidal; sterile filament almost always present.
 15. A recurved usually hairy, slender, sterile filament always present; sepals distinct, flowers usually more than 10 mm. long. ** PENSTEMON
 15. An erect, flattened, glabrous, sterile filament usually present; sepals at least partly united, flowers 6-12 mm. long. 7. SCROPHULARIA
 12. Stigmas distinct, either wholly free, or the edges joined forming a small tube.
 16. Stamens 2; pedicels 2-bracteolate below the calyx.
 8. GRATIOLA

16. Stamens 4; bracteoles lacking.

17. Sepals all distinct or almost so, the 2 innermost narrower than the three outer; flowers axillary.

9. BACOPA

17. Sepals always at least partly united, of equal width, forming a tube, more or less investing the capsule; flowers usually forming a spike-like raceme.

* MIMULUS

1. VERBASCUM (Bauhin) L.

Sp. Pl. 177. 1753.

Erect, simple biennial or perennial herbs; cauline leaves alternate sessile, clasping or decurrent, glabrous or beset with simple, glandular or stellate, glandless hairs, entire, irregularly dentate or crenate-sinuate, 5-40 (or more) cm. long, ovate, lance-ovate or lanceolate; flowers in a dense or loose spike, raceme or interrupted raceme; sepals distinct, uniform, usually attenuate, shorter or longer than the mature capsule; corolla mostly yellow, occasionally white or rarely purple, almost regular, lower lobe slightly exceeding the upper; stamens 5, filaments usually with some pubescence, all alike or lower pair different from upper 3; stigma capitate, wholly united; the septicidal capsule ellipsoid, globose, cylindric or triangular-cylindric; seeds wingless, numerous.

1. Calyx, pedicels and stems beset with simple, glandular hairs; filaments with long purple hairs; capsule sub-globose; pedicels 10-15 mm. long. 1. V. BLATTARIA

1. Calyx, pedicels, stems and leaves densely tomentose or villose with stellate, glandless hairs; filaments villose with yellow hairs, occasionally glabrous; capsule ovoid, cylindric or triangular-cylindric; pedicels lacking or up to 10 mm. long or slightly longer.

2. Leaves decurrent, flowers in dense (uninterrupted) spikes of one or a few flowers, pedicels minute, up to 2 mm. long; leaves densely tomentose; capsule ovoid or cylindric. 2. V. THAPSUS

2. Leaves sessile, villose, clasping; flowers in a dense spike above but interrupted below, lower axillary on developed pedicels up to 10 mm. long, or longer, upper in small, sub-sessile, 2-3 flowered fascicles; capsule cylindric or triangular-cylindric.

3. V. VIRGATUM

1. VERBASCUM BLATTARIA L., Sp. Pl. 178. 1753.

Cauline leaves sinuously-dentate or crenate, 2-12 cm. long, glabrous or almost so, not decurrent; pedicels exceeding the bracts; calyx lobes 5-8 mm. long, linear-lanceolate; corolla yellow (occasionally white), 25-35 mm. wide.

Open sites. Churchill and Elko Counties.

2. VERBASCUM THAPSUS L., Sp. Pl. 177. 1753.

Cauline leaf-blades 5-30 cm. long, entire or almost so, densely tomentose, decurrent; pedicels shorter than the bracts; calyx lobes 7-9 mm. long, lanceolate or ovate-lanceolate; corolla yellow, 15-20 mm. wide.

Mostly in wet open sites. Churchill, Douglas, Elko, Humboldt, Lyon, Nye, Storey and Washoe Counties.

3. VERBASCUM VIRGATUM Stokes. ex With., Bot. Arr. Brit. Pl. ed. 2. 1:227. 1787-93.

Stems up to 12 dm., stellate-pubescent, simple or slightly virgately branched; cauline leaf-blades 7-15 cm. long, lanceolate, crenate, not decurrent, the 1-4 pedicels 2-5 mm. long, shorter than or equaling the ovate bracts; sepals lanceolate, 5-6 mm. long; corolla about 25 mm. wide, yellow; capsule 7-8 mm. long.

Dry sites. Lyon, Ormsby and Washoe Counties.

2. LINARIA (Bauhin) Mill.
Gard. Dict. ed. 4. 1754.

Perennial, glabrous, upright, somewhat branching herbs with narrow scattered, sessile leaves; the inflorescence a short terminal raceme; bracts, short, bracteoles lacking; sepals 5, distinct; corolla 2-lipped, yellow with an orange palate (the lower lip), 15-20 mm. long, excluding the prominent, straight, stout, ventral spur; stamens 4, didynamous, anthers glabrous, distinct; stigmas united, scarcely capitate; capsule cylindric to globose, rupturing irregularly across the distal width of each cell; seeds, with circular wings. A single species. . L. VULGARIS

LINARIA VULGARIS Hill, Brit. Herb. 109. 1756.

Antirrhinum linaria L.; Linaria pensylvanica Scheele; L. linaria Karst.

Stems 5-10 dm. tall; leaves widely linear; the strongly developed palate wholly closing the corolla orifice; capsule 9-12 mm. long, rupturing near the apex; seeds 1.5 mm. wide.

Dry exposed sites. Douglas and Elko Counties.

3. MOHAVEA A. Gray
Pacif. R. Rep. 4:122. 1857.

Erect, annual, mostly pubescent herbs; leaves scattered, sessile; flowers axillary to foliose bracts, short-pedicel in close, short racemes; bractioles lacking; sepals 5, distinct; corolla bilabiate, mostly yellow, with brown or purple markings, the tube sometimes green-tinged, slightly pouched at the base ventrally and with a hairy, well-developed palate (the lower lip) closing or almost closing the orifice; stamens 2, anthers glabrous, cells divaricate; stigmas and styles wholly united, styles pubescent, persistent on the developing indehiscent, ovoid, cylindric capsule which ruptures by irregular transverse distal breaks; seeds black, ovoid-discoid, somewhat flattened dorso-ventrally, each surrounded by an incurved wing.

1. Corolla 15-20 mm. long with a very inflated palate, lobes free from the orifice to the unevenly ovate tips, tube short; leaves lanceolate or ovate-lanceolate; pubescence strongly gland-tipped.

1. M. BREVIFLORA

1. Corolla 30-40 mm. long, palate less inflated, lobes united forming a long campanulate tube, only their mucronate-acuminate tips free; leaves linear-lanceolate; pubescence obscurely gland-tipped.

2. M. CONFERTIFLORA

1. MOHAVEA BREVIFLORA Coville, Contr. U. S. Nat. Herb. 4:168. 1893.

Stems 1-2 dm. tall, floriferous nearly throughout; floral leaves lanceolate to ovate-lanceolate; pedicels at maturity up to 2.5 cm. long; sepals 10-11 mm. long; capsule 8-10 mm. long.

Dry exposed sites. Clark County.

2. MOHAVEA CONFERTIFLORA (Benth.) Heller, Muhlenbergia 8:48. 1912.
Antirrhinum confertiflorum Benth. in A. DC.; Mohavea viscida Gray.

Stems 2-5 dm. tall, distally floriferous; leaves linear or lance-linear, floral ones 6-9 cm. long; pedicels 5-10 mm. long; sepals lanceolate, attenuate, 11-13 mm. long; corolla 30-35 mm. long; capsule 10-12 mm. long; seeds black, 2.0-2.5 mm. long.

Dry exposed sites. Clark County.

4. ANTIRRHINUM (Bauhin) L.
Sp. Pl. 612. 1753.

Erect annual herbs; corolla whitish with purple markings; at least the upper leaves alternate (sometimes distantly), lanceolate-linear or narrowly ovate, entire; flowers solitary or in loose, secund racemes;

calyx of 5 clustered sepals, often of different sizes; corolla very zygomorphic with a palate, (the lower lip), in the throat and a ventral pouch (nectary); stamens 4, didynamous; stigmas united, minute; capsule asymmetrical, the dorsal cell narrower (than the ventral) dehiscent by a single distal pore; the lower cell set wholly ventral to the axis of the flower, opening by two distal pores (these occasionally confluent). A single species. A. KINGII

ANTIRRHINUM KINGII S. Wats., Bot. King's Expl. 215. Pl. 21. 1871.

Plants glabrous below the sparsely glandular-pubescent inflorescence; leaves oblanceolate-oblong; inflorescence distally a second raceme; lower flowers remote; anthers dark-violet; seeds with thin, interrupted, wing-ridges.

Dry exposed sites. Esmeralda, Nye and Washoe Counties.

5. ASARINA (Lobel.) Mill.
Gard. Dict. ed. 7. 1759.

Twining perennial herbs with scattered linear to linear-lanceolate leaves; flowers axillary to foliose bracts, bracteoles lacking; sepals 5, distinct; corolla yellow, 10-12 mm. long, with a palate in the throat (the lower lip) and a ventral pouch (nectary); stamens 4, didynamous, anthers tending to adhere, discharging pollen together; stigmas small united, little capitate; capsule globose, indehiscent, rupturing across the distal portion of the equal cells; seeds black, 1 mm. long and wide, wings continuous. A single species. A. FILIPES

ASARINA FILIPES (Gray) Pennell, Proc. Acad. Nat. Sci. Phila. 99:174. 1947.

Antirrhinum filipes Gray; Negacrrhinum filipes (Gray) Rothmaler;
Antirrhinum cooperi Gray.

Plants glabrous except at the base of the stem, there villose or lanate; leaves entire, short-petioled; peduncles up to 70 cm. long (30-70); pedicels 2-6 mm. long; sepals 2.5-4 mm. long, lanceolate, entire; capsule 5 mm. long.

Dry exposed sites. Clark and Nye Counties.

6. COLLINSIA Nutt.
Journ. Acad. Phila. 1:190. 1817.

Herbs, with opposite, dentate to entire leaves, sessile or short-petioled, linear to narrowly ovate (occasionally the lower sub-rotund); flowers solitary or fascicled, axillary to leafy bracts, these sometimes reduced above; sepals 5, united 1/6 to 1/2 their length; corolla cyanic,

very zygomorphic, its tube sagittately flattened, gibbous above at the base; the upper lip arched from the base, ascending, mostly shorter than the lateral lobes of the lower lip, almost wholly hiding the concave middle lobe (lowest) which contains the genitalia; stamens 4, included, slightly didynamous, anther cells divaricate; capsule loculicidal; the wingless seeds few. The flower simulates those of the Papilinoideae.

1. Inflorescence almost glabrous to villose pubescent, occasionally glandular, but then the glands small, barely broader than the hairs.

1. C. PARVIFLORA

1. Inflorescence glandular-pubescent, the glands well-developed, much broader than the hairs.

2. Only the upper bracts reduced, subulate, barely $1/3$ as long as the 5-10 mm. pedicels; upper lip of the corolla white, lower blue.

2. C. TORREYI

2. The bracts gradually reduced, the uppermost about $1/2$ as long as the 5-25 mm. pedicels; corolla pale-violet, or dull-white with violet markings. 3. C. CHILDII

1. COLLINSIA PARVIFLORA Dougl. ex. Lindl. in Pax., Bot. Reg. 13: Pl. 1082. 1827.

Collinsia grandiflora var. pusilla Gray; C. breviflora Suksd.; C. pusilla Howell.

Plant 0.5-4 dm. tall; stem and pedicels minutely canescent-puberulent; leaves oblong-lanceolate, obtuse, crenately-dentate to usually entire, glabrous, 2.5-3.5 cm. long, sessile (the bracts sometimes ternate or quaternate); inflorescence becoming lax at maturity; bracts scarcely reduced, each subtending 1 or 2 flowers; pedicels 5-25 mm. long; calyx 6-7.5 mm. long, glabrous, sepals united $2/5$ of their length; corolla 4-8 mm. long, glabrous, upper lip white, or distally blue-violet; lower lip longer, lateral lobes distally blue-violet, equaling in length the paler median lobe; capsule up to 5 mm. long; seeds 2 mm. long, oval, turgid, their margins recurved.

Open, well-drained sites, 4,600-10,000 ft. Clark, Douglas, Elko, Humboldt, Lander, Lincoln, Nye, Storey, Washoe and White Pine Counties.

2. COLLINSIA TORREYI Gray, Proc. Amer. Acad. 7:378. 1868.

Collinsia torreyi var. brevicarinata Newsom.

Widely branched herbs, 1-2 dm. tall, stem, pedicels and calyces glandular-pilose; leaves widely linear, obtuse, entire or slightly dentate, 2.5-3.5 cm. long, sessile or short-petioled, bases attenuate, proximally villulose on the midrib and petiole; inflorescence lax; lowest bracts foliose, the others subulate, much reduced, about $1/3$ the length of the pedicels which reach 5-10 mm. and are reflexed in fruit;

corolla 7-9 mm. long, glabrous, upper lip white, mauve-spotted, erect, lower lip longer, lateral lobes equaling to longer than the median; capsule about 3 mm. long; seeds 1 to a cell, 1.5 mm. long, oblong, turgid. Open, well-drained, sandy sites. Douglas and Washoe Counties.

3. *COLLINSIA CHILDII* Parry ex Gray, Syn. Fl. N. Amer. Part 1:257. 1878.
Collinsia inconspicua Congd.; C. breviflora Suksd.

Herbs, 1.5-4 dm. tall; stem distally glandular-pubescent, older growth finely pubescent but glandless; leaves glabrescent, oblong-lanceolate, acutish to obtuse, denticulate to nearly entire, 2-4 cm. long, short-petioled; inflorescence lax; upper bracts much reduced, each subtending 1 to 3 flowers; pedicels glandular-pubescent, 3-25 mm. long; calyx 5-7 mm. long, finely glandular-pubescent on ribs, sepals united 2-3 mm., their free portions lanceolate, obtuse or obtusish; corolla 6-7 mm. long, glabrous, basal pouch reduced, lips pale-violet or whitish, violet-lined, upper not arched, merely ascending, as long as or slightly longer than the lower of which the lateral lobes exceed the hyaline, median, lowermost; capsule 4 mm. long; seeds solitary in each cell, 3 mm. long, oval, turgid, margins somewhat recurved.

Doubtfully occurring in Nevada, one fruiting specimen seen (E. O. Wooten, 29 May, 1927, Ormsby Co., Ash Canyon, west of Carson City) which appears to be closest to Collinsia childii Parry.

7. *SCROPHULARIA* (Bauhin) L.
Sp. Pl. 619. 1753.

Perennial herbs; stem erect, strong scented, 4-angled, glandular-pubescent, at least in part; leaves opposite, petioled, toothed and sometimes variously incised at least below; flowers in glandular-pubescent panicles; calyx of 5, almost distinct, often glandular-pubescent sepals; corolla bilabiate, greenish-purple to maroon, upper lip exceeding the flat, projecting lower, which has vertical lateral lobes, and the median lobe deflexed or recurved; stamens 4, included, somewhat didynamous; rudiment of the uppermost (fifth), sterile, scale-like, occasionally entirely lacking; stigma minute, on a long style; capsule septicidal; seeds numerous, plump, furrowed.

1. Sterile filament usually longer than wide, clavate to obovate, or subrotund; corolla dorsally mostly maroon-brown.

2. Corolla 8-15 mm. long, upper lobes nearly the length of the tube; sepals oblong to ovate (occasionally erosely rounded); leaves simply to doubly dentate, larger blades cordate at base.

1. S. CALIFORNICA

2. Corolla 5-8 mm. long, the upper lobe much shorter than the tube; sepals circular or nearly so, broadly rounded, obviously overlapping in flowering; leaves sharply doubly dentate or incised or

laciniate, truncate to slightly cordate. 2. S. MULTIFLORA

1. Sterile filament wider than long; corolla dorsally greenish or greenish-brown, rarely white.
3. Capsule 7-8 mm. long; corolla 6-10 mm. long; leaves doubly-toothed, rarely incised. 3. S. LANCEOLATA
3. Capsule 5-11 mm. long; corolla 9-11 mm. long; leaves often incised.
4. S. NODOSA

1. SCROPHULARIA CALIFORNICA Cham. & Sch., Linnaea 2:585. 1827.

Scrophularia nodosa var. californica M. E. Jones; S. oregana Pennell.

Stem 10-15 dm. high, finely glandular-pubescent; inflorescence glandular-puberulent; leaves up to 9-11 cm. long, 6-8 (-10) mm. wide, triangular-ovate, acute, petioles 3-5 cm. long; panicles narrow, up to 40 cm. long, 5-10 cm. wide; sepals 3-4.5 mm. long, oblong, to ovate acuminate to obtuse (sometimes slightly rounded), mostly little overlapping in flower, almost not at all in fruit; capsule ovoid-conic, 6-8 mm. long.

Dry sites to creek banks, 4,000 ft. upwards. Humboldt, Mineral, Nye and Washoe Counties.

2. SCROPHULARIA MULTIFLORA Pennell, Proc. Acad. Nat. Sci. Phila. 99:173 1947.

Scrophularia californica var. floribunda Greene; S. floribunda Heller, non Boiss. and Bal.; S. californica var. laciniata Jepson, non Waldst. and Kit.

Stem 6-12 dm. high, glandular-pubescent; inflorescence strongly glandular-pubescent; leaves 4-15 cm. long, 3-10 cm. wide; petioles 2-6 cm. long; panicles lax, up to 50 cm. long, 5-10 cm. wide; sepals 2-3 mm. long, nearly circular, rounded, much overlapping in flowers, somewhat less so in fruit; capsule globose-conic, 5-7 (-8) mm. long.

Dry, open sites 4,500 ft. upwards. Douglas, Lander, Nye and Washoe Counties.

3. SCROPHULARIA LANCEOLATA Pursh., Fl. Amer. Sept. 419. 1814.

Scrophularia nodosa var. occidentalis Rydb.; S. occidentalis Bickn.

Stem 10-15 dm. high, glandular-pubescent or -puberulent; inflorescence strongly glandular-pubescent; leaves up to 9-12 cm. long, 4-6 (-8) cm. wide, very variable shape, lance-oblong to ovate, acute or somewhat acuminate, lowest (the largest) occasionally incised, petioles 1-3 (-5) cm. long; panicle up to 50 cm. long, 10 cm. wide; sepals 2-4 mm. long, narrowly-ovate to rounded-ovate, no or very little overlapping in flower

or fruit; corolla 9-14 mm. long; capsule when mature very long, acuminate 7-8 (-9) mm.

Valley floors, slopes and stream banks, well-drained sites, 4,000 ft. upwards. Douglas, Elko, Mineral, Storey and Washoe Counties.

4. SCROPHULARIA NODOSA L., Sp. Pl. 619. 1753.

Erect, herb, up to 9 dm. tall, glandular-pubescent, especially the inflorescence; leaf-blades ovate, acute up to 14 cm. long, 8 cm. wide, the margins doubly and irregularly dentate ~~to~~ often incised, petioled (except the few uppermost bracts); inflorescence elongate, pedicels 3-4 times the length of the calyx; sepals 3-4 mm. long; corolla 9-14 mm. long, the tube about equaling the limb; capsule ovoid-conic, up to 11 mm. long. Rare in Nevada, only 2 collections seen.

Dry open sites. Elko and Washoe Counties.

8. GRATIOLA L.
Sp. Pl. 17. 1753.

In ours erect, annual, pubescent or glabrous herbs; leaves opposite, sessile, entire to denticulate, usually glabrous, lanceolate to lance-ovate, 1.5-7.5 cm. long; flowers in a loose raceme; sepals distinct, uniform with 2 bracteoles immediately below the 4-8 mm. long, calyx; corolla mostly whitish (or light-brown), drying yellow, with clavate hairs inside at the throat and on the lobes; stamens 4, of which 2 are sterile, these often rudimentary or lacking; the anther connective much expanded; stigmas free, flattened; capsule loculicidal, seeds many, wingless, 0.7-0.8 mm. long, cylindric, bright or dull gold colored when dry. Up to 15 cm. tall. A single species. G. VIRGINIANA

GRATIOLA VIRGINIANA L., Sp. Pl. 17. 1753.

G. sphaerocarpa Ell.

One collection seen. Meadow, Washoe County.

9. BACOPA Aubl.
Hist. Pl. Guiane Franc. 1:128. 1775.

Herbs (in ours) of very moist to truly aquatic habitats with usually weak stems often forming mats, distantly pubescent or glabrous; leaves opposite, up to 3.5 cm. long and almost as broad, thin, round-ovate to suborbicular, bases narrowed, clasping, clearly palmately many-nerved; pedicels much exceeding the 6-12 mm. long calyx; the 2 outer green sepals about 3 times as broad as the hyaline inner; corolla exserted, 6-10 mm. long, campanulate, white with yellow throat; styles distinct (bifid) at apex; stigmas distant; capsule 4-6 mm. long; seeds

many, 0.5-0.6 mm. long, light to dark-brown. A single variable species.
B. ROTUNDIFOLIA

BACOPA ROTUNDIFOLIA (Michx.) Wettst., Pflanzenf. 4, 3b. p76. 1891.
Ranapalus eisenii Kell.; Macuillamia eisenii Pennell; Bacopa eisenii Pennell; Monniera rotundifolia Michx.; also Herpestris, Mecardonia, Pagesia spp.

A very variable species in a group notorious for small and irregular differences. The generic description is for B. rotundifolia only, however, the salient features (the sepal size differences and the style apex when not bifid at least dilated) hold throughout the genus. The inclusion of B. eisenii can be justified on the same basis as the lumping of all the generic names listed in synonymy, simply that the differences are too erratic to be of taxonomic value. Bacopa is the oldest (aboriginal) name. This portion of the Gratioleae is a thorn and no doubt will continue to be one until a comprehensive treatment with cytogenetic evidences is concluded. Collections seen thus far are from Churchill and Washoe Counties. The writer is aware that quite an hiatus exists separating these western from the older eastern U. S. collections of rotundifolia. In spite of this he feels that at present, this is at least the most practical course to follow.

10. LIMOSELLA (Lindern) L.
Sp. Pl. 631. 1753.

Acaulescent glabrous herbs, annual or perennial by stolons; leaf-blades long-petioled, fleshy, entire, palmately veined; flowers solitary on long pedicels; bracteoles lacking; calyx campanulate, sepals united about half their length; corolla 5 parted, white or pinkish or purplish tinged; anthers entirely confluent, 1-locular; style short, clavate; stigmas united capitate; capsule globular, septicidal, distally 1-celled, the septum not extending through or disappearing; seeds numerous. Plants of fresh, brackish or saline mud, "mudworts".

1. Leaf-blades oblong to elliptic, abruptly or cuneately narrowed to petioles 2 to 4 times longer than the blade. 1a. L. AQUATICA
1. Leaves awl-shaped or filiform, blades not or only slightly distinct from petioles. 1b. L. AQUATICA
var. TENUIFOLIA

1a. LIMOSELLA AQUATICA var. TYPICA L., Sp. Pl. 631. 1753.

Plants caespitose, densely floriferous, leaf-blades up to 1.5 cm. long.
Elko, Humboldt, Mineral and Nye Counties.

1b. LIMOSELLA AQUATICA var. TENUIFOLIA Hoffm., Deutschl. Fl. 29. 1804.

Plants sparingly floriferous, not as matted; leaf-blades, when awl-shaped, less than 1.5 cm. long.

Elko County (one collection seen, Holmgren, 1774).

The variety intergrades with the typical over most of its range and may well do so in Nevada.

11. VERONICA (Bauhin) L.
Sp. Pl. 9. 1753.

Herbs, with mostly opposite (occasionally alternate) leaves, erect or repent; corolla rotate, tube short, cyanic, lobes 4 (by complete fusion of the upper pair); stamens 2, the anterior pair lost; sepals 4 (rarely 5), distinct, stigmas united; style entire; capsule 2-locular, flattened, loculicidal; seeds flattened, few to many, smooth or sometimes rough.

Key to Sub-genera

- A. Main stem terminating in an inflorescence; upper leaves bractlike, alternate; flowers densely crowded, or remote and axillary. I. VERONICELLA
- B. Main stem never terminating in an inflorescence; leaves opposite throughout; flowers all in axillary racemes. II. EUVERONICA

I. VERONICELLA

1. Flowers only in upper leaf-axils forming definite racemes; perennials.
2. Capsule longer than wide; style much shorter than the capsule; corolla violet-blue rarely almost white, glabrous inside; stems erect or only slightly repent. 1. V. WORMSKJOLDII
2. Capsule wider than long; style almost equaling capsule; corolla white or bluish, tube pubescent internally; stems repent, ascending only at apex. 2. V. SERPYLLIFOLIA
1. Flowers in most leaf-axils, not in definite inflorescences; fibrous-rooted annuals.
3. Pedicels shorter than the lanceolate to linear sepals; style minute; corolla whitish throughout; seeds many; stems erect; plants glabrous or with gland-tipped hairs. 3. V. PEREGRINA
3. Pedicels longer than the ovate sepals; style prominent, about equaling capsule; corolla mostly violet-blue; seeds few; stems

repent; pubescence pilose, glandless. 4. V. PERSICA

1. VERONICA WORMSKJOLDII Roem. and Sch., Syst. Veg. 1:101. 1817.

Erect 1-3 dm. tall, stem and leaves loosely pilose; inflorescence including the capsule glandular-pubescent; leaf-blades oval, obtuse or rounded, dentate to entire, rounded to sessile bases; pedicels 2-5 mm. long; sepals obtuse, 4 mm. long; corolla 6-8 mm. wide; filaments 1 mm. long; style 1-2 mm. long; capsule 5-7 mm. long; seeds 1 mm. long.

Dry to moist open stations 7,500-10,000 ft. Elko and Washoe Counties.

2. VERONICA SERPYLLIFOLIA L., Sp. Pl. 12. 1753.

Only the distal part of seasons stem erect, bearing fruit; stems and pedicels mostly with fine, appressed hairs; leaf-blades ovate-oblong or oval, sessile or the lower short-petioled, entire or crenate; pedicels up to 4-5 mm. long; sepals elliptic-oblong, obtuse, 3-4 mm. long; corolla pale (blue) or white, 4-5 mm. wide; filaments 1 mm. long; style 1.5-2 mm. long; capsule 3 mm. long (larger, up to 10 mm. in the variety), wider than long, very obcordate, finely glandular-pubescent; seeds 0.5 mm. long.

1. Corolla 4-5 mm. wide; hairs on stem finely-appressed; stems about 1-2 dm. long. 2a. V. SERPYLLIFOLIA
var. TYPICA

1. Corolla 5.5-8 (-10) mm. wide, pale-blue, hairs on stem spreading pilose; stems exceeding 2 dm. in length. 2b. V. SERPYLLIFOLIA
var. HUMIFUSA

2a. VERONICA SERPYLLIFOLIA var. TYPICA L.

Douglas, Elko, Humboldt, Nye, Ormsby, White Pine and Washoe Counties.

2b. VERONICA SERPYLLIFOLIA var. HUMIFUSA (Dickson) Vahl, Enum. 1:65. 1805.

V. humifusa Dickson; V. funesta Macb. & Pays.

One specimen seen Maquire and Holmgren 25,904. 8,000 ft. Nye County.

3. VERONICA PEREGRINA var. XALAPENSIS (H.B.K.) St. John and Warren, Northwest Sci. 2 no. 3:928.

V. xalapensis H.B.K.; V. peregrina subsp. xalapensis (H.B.K.)

Pennell; V. sherwoodiae Peck.

Erect, beset with short gland-tipped hairs throughout; leaf-blades linear-oblong, obtuse, dentate to entire, sessile or the lower short-petioled; raceme leafy-bracted throughout and extending from the lower leaf-axils; pedicels 1-2 mm. long; sepals linear-oblong, oblanceolate, obtuse, 3 mm. long; corolla 2.0-2.5 mm. wide, white; filaments very short, less than 1 mm. long, style 0.2-0.3 mm. long; capsule 3.0-3.5 mm. long; seeds 0.5 mm. long.

Sandy dry to wet exposed sites, 5,500-9,000 ft. Douglas, Elko, Eureka, Lincoln, Mineral and Washoe Counties.

4. VERONICA PERSICA Poir., Encycl. 8:542. 1808.

Annual, pubescent, glandless; leaves scattered or alternate, leaf-blades ovate, obtuse, dentate with rounded lobes, truncate to short petioles; inflorescence lax, leafy-bracted; pedicels of mature fruit 30-35 mm. long; sepals elliptic-ovate, obtuse, short-ciliate, 5 mm. long; corolla 7-11 mm. wide, violet-blue, pale ventrally, the lobes darker veined; filaments and style 2 mm. long; capsule 2.5-3 mm. long, widely notched, the rectangular lobes widely flaring; seeds 1.5 mm. long.

Dry exposed sites. Washoe County.

II. EUVERONICA

1. Capsule wider than long, strongly obovate with leaves oval, acute or acutish, serrate; or capsule retuse, deeply notched, cells rounded with leaves linear to linear-lanceolate, setaceous-toothed or entire.

2. Plants pubescent; inflorescence spike-like, pedicels 1.0-1.5 mm. long; capsule obovate, notch small or lacking, leaves serrate to crenate-serrate. 5. V. OFFICINALIS

2. Plants glabrous; inflorescence a lax raceme, pedicels 6-17 mm. long; capsule deeply notched, retuse with rounded cells; leaves linear to linear-lanceolate, setaceous-toothed or entire.

6. V. SCUTELLATA

1. Capsule longer than wide, oval or ovate; leaves lanceolate to ovate or obovate-lanceolate, low serrate to denticulate; plants of aquatic to sub-aquatic habitats.

3. All of the leaves with petioles; racemes usually 10-25 flowered; corolla 7-10 mm. wide, violet-blue with darker lines; leaves lanceolate to ovate-lanceolate. 7. V. AMERICANA

3. At least the upper leaves sessile; racemes many flowered (15-60); corolla 5 mm. wide, pale-lavender; lobes violet-lined; leaves lanceolate to obovate-lanceolate. . . . 8. V. ANAGALLIS-AQUATICA

5. VERONICA OFFICINALIS L., Sp. Pl. 11. 1753.

Perennial, pubescent, stems repent ascending at the ends, 3-6 dm. long; blades of the opposite leaves oval, acute or acutish, crenate-serrate, base narrowed to a short petiole; racemes spike-like axillary, small-bracted, pedicels 1.0-1.5 mm. long; sepals 3 mm. long; oblong-lanceolate, acute; corolla 6-8(-9) mm. wide, violet-lined; filaments 2 mm. long; style 3 mm. long; capsule 4 mm. long, retuse obovate; seeds 1 mm. long.

Reported as occurring in the State.

6. VERONICA SCUTELLATA L., Sp. Pl. 12. 1753.

Perennial, glabrous throughout except forma villosa (Schum.) Pennell, 1-6 dm. tall; leaf-blades linear to linear-lanceolate, remotely setaceous-toothed or entire; pedicels 6-17 mm. long; bracts small; sepals oblong, acute, 3 mm. long; filaments 2.5 mm. long; style 2-4 mm. long; capsule 3-4 mm. long, deeply notched, the lobes divaricate, rounded; seeds 0.5-1.0 mm. long.

Moist, exposed site. Douglas County (only one specimen seen, but that very typical).

7. VERONICA AMERICANA (Raf.) Schwein. ex Benth. in A. DC. Prod. 10:468. 1846.

Veronica beccagunga var. americana Raf.

Perennial, glabrous; leaf-blades lanceolate to ovate-lanceolate, serrate to denticulate, acutish to acute; pedicels 5-13 mm. long; sepals 3 mm. long, oblong-lanceolate, acute; filaments and style 2.5-3.0 mm. long; capsule 3-4 mm. long, oval, acutish or rounded; seeds 0.5 mm. long.

The most common species in Nevada, inhabiting streams and moist open sites. Very variable in size and foliage. From 550 ft. to over 9,000 ft. throughout the State except Esmeralda, Eureka, Ormsby and Pershing Counties (where it probably occurs but has not been collected). Flowers May to September.

8. VERONICA ANAGALLIS-AQUATICA L., Sp. Pl. 12. 1753.

Glabrous throughout or inflorescence obscurely glandular-pubescent; leaf-blades oblong-lanceolate, acute, serrate to denticulate (autumnal shoots smaller, narrower, short-petioled); pedicels 6-8 mm. long; sepals 4.0-4.5 mm. long, lanceolate, acute; style 1.8-2.5 mm. long; capsule 4 mm. long, ovate, obtuse at the narrowed apex which may or may not be notched; seeds 0.5 mm. long.

Wet to moist open sites. Clark, Elko, Lincoln and Nye Counties, above 3,000 ft.

It is interesting to note that V. arvensis L. has not been reported in Nevada. The cosmopolitan distribution of this taxon would lead one to expect its occurrence in the State.

One collection, Moore and Franklin 591 from White Pine County, is possibly a new species. It belongs to the Sub-genus Veronicella (Fabricius) Pennell and appears to be closely related to V. cusickii Gray. However, the sheet does not have any mature fruit so that an accurate determination of its position and a complete description are not possible. It differs from V. copelandii Eastw. in its glabrous, elliptic-oval to sub-rotund foliage and 4 sepals. It differs from both in that the lower leaves are short-petioled. This taxon superficially resembles V. arvensis L.

12. SYNTHYRIS Benth.

A. DC. Prod. 10:454. 1846.

Perennial glandless herbs; leaves mostly basal, petioled with reniform, orbicular, or ovate blades which are toothed or cleft, those of the stem alternate, reduced and bract-like; flowers blue or violet-blue, almost regular in terminal racemes; calyx 4-parted, sepals distinct; corolla campanulate or short-tubular, 4-lobed; stamens 2, filaments adnate to the tube; stigmas united, minute capitate; capsule compressed, septicidal; seeds few, sides flat or concave. A single species.

S. RANUNCULINA

SYNTHYRIS RANUNCULINA Pennell, Proc. Acad. Nat. Sci. Phila. 85:92. 1932.

Endemic in the Charleston Mts., Clark County.

13. CASTILLEJA Mutis ex L.

Suppl. Syst. Veg. 47. 1781.

Erect, ebracteolate perennial or annual herbs with alternate leaves and (in ours) spike-like racemes of red-yellow or purple-bracted flowers; calyx of 4 or seemingly 2 lobes; corolla (in ours) greenish, 2-lipped, upper galeate, lower shorter to rudimentary; stamens 4, didynamous with unequally placed anthers; capsule turgid, ovoid, glabrous, loculicidal; seeds many, wingless, reticulate.

1. Annuals, leaves and bracts entire (or almost so).

2. Galea much shorter than the corolla-tube, only about 1/3 as long; calyx gibbous and broadest at the base with the second cleavage often lacking or rudimentary, less than 1 mm. long; corolla exserted. 1. C. MINOR

2. Galea only little shorter than or equal to the corolla-tube, usually about 3/4 as long; the second cleavage of the calyx about 1-1.5

- mm. long; corolla included in the calyx. 2. C. EXILIS
1. Perennials, leaves (at least the upper) almost always with 1 or more pairs of lobes; bracts usually lobed, sometimes entire.
3. Lip more than $1/2$ as long as the galea.
4. Bracts entire, or with no more than 1 pair of lobes near the apex (occasionally with a second reduced pair at the base or summit of the center lobe).
5. Lip only little more than $1/2$ the length of the galea; calyx 10-13 mm. long. 3. C. LINOIDES
5. Lip $3/5$ to almost equal to the galea; calyx (12-)15-16 mm. long.
6. Corolla 16-22 mm. long; bracts white-margined. 4. C. PILOSA
6. Corolla (11-)13-16(-19) mm. long; bracts dull-yellow or dull purplish-red.
7. Calyx cleft equally medianly and laterally and always more than halfway; lip $3/5$ as long to almost equaling the galea. 5. C. RUBIDA
7. Calyx unequally cleft, halfway medianly, less laterally; bracts about equal to calyx in length; lip almost equal to galea in length. . . 6. C. RUBIDA
var. MONOENSIS
4. Bracts more than 3-cleft (at least 2 pairs plus the apex).
8. Lip little more than $1/2$ the length of the galea. 3. C. LINOIDES
8. Lip $2/3$ to $3/4$ or almost as long as the galea.
9. Calyx and corolla about 20 mm. long (18-22 mm.).
10. Corolla little exceeding the calyx; lip $2/3$ - $3/4$ as long as the galea; stems and leaves finely-puberulent to hispid. 7. C. PALLESCENS
10. Corolla little shorter than the calyx; lip almost as long as the galea; stems and leaves finely-puberulent. 8. C. PALLESCENS
var. INVERTA
9. Calyx and corolla less than 20 mm. long; almost never

more than 18 mm.

11. Calyx cleft equally medianly and laterally always more than halfway; bracts usually shorter than the calyx; lip $3/5$ to almost as long as the galea.

5. *C. RUBIDA*

11. Calyx unequally cleft, halfway medianly, less laterally; bracts about equal to calyx in length; lip almost equal to the galea. 6. *C. RUBIDA*

var. *MONOENSIS*

3. Lip less than $1/2$ as long as the galea.

12. Corolla 25 mm. or longer.

13. Galea $1/2$ or less than $1/2$ the length of the corolla (corolla-tube equal to or longer than the galea).

14. Bracts (as opposed to the true leaves) entire or with 1 pair of lobes (3-cleft); plants more than 1 dm. tall.

15. Leaves (at least the lower) entire or occasionally with 1 pair of lobes (3-cleft); stems glabrous, or pilose or if hirsute, then corolla (35-)40-55 mm. long.

16. Corolla 40-55 mm. long; calyx 30-32 mm. long.

9. *C. OBLONGIFOLIA*

16. Corolla 17-35 mm. long; calyx 17-23 mm. long.

17. Galea 10-20 mm. long; bracts lanceolate or lance-ovate.

18. Leaves narrowly to broadly lanceolate; bracts when not entire, with 1 pair of long, slender lobes. 10. *C. MINIATA*

18. Leaves linear-lanceolate to oblong-lanceolate to ovate; bracts when not entire, with a pair of short lobes and a wide apex.

11. *C. RHEXIFOLIA*

17. Galea 6-9 mm. long; bracts shield-shaped.

12. *C. HELLERI*

15. Leaves with 2 or more pairs of lobes; or if entire, or with 1 pair, then stems hirsute, corolla less than 40 mm.

19. Main leaves with 2-3 pairs of lobes; calyx-lobes

- oblong rounded. 13. *C. HISPIDA*
19. Main leaves with 1 pair of lobes or entire; calyx-lobes acute, lanceolate to ovate. . 14. *C. HISPIDA*
subsp. *ACUTA*
14. Bracts with more than 3 lobes (2 pairs or more, plus apex), or plant less than 1 dm. tall.
20. Leaves entire or with 1 pair of lobes; bracts varying on the same plant from unlobed to having 2 pairs; plants when mature more than 1 dm. tall (4-6 dm.).
10. *C. MINIATA*
20. Leaves with 3-5 lobes; dwarf, up to 1 dm. tall.
15. *C. BARNEBYANA*
13. Galea more than 1/2 the length of the corolla (corolla-tube shorter than the galea).
21. Calyx 25 mm. or more.
22. Plants when mature not exceeding 2 dm. tall; galea 16-19 mm. long. 16. *C. CALCICOLA*
22. Plants when mature 5-9 dm. tall; galea 20-25 mm. long.
23. Stems hirsute at the base with white hairs.
24. Middle portion of the stem glabrous.
17. *C. LINARIAEFOLIA*
24. Middle portion of the stem gray-pubescent.
18. *C. LINARIAEFOLIA*
f. *OMNIPUBESCENS*
23. Stems puberulent or hirsute, not bearing white hairs at the base.
25. Leaves all entire; lower lip of the corolla 2 mm. long. 9. *C. OBLONGIFOLIA*
25. Upper leaves 3-lobed; lower lip of the corolla 4 mm. long. 19. *C. SUKSDORFII*
21. Calyx 25 mm. or less.
26. Stem at least partly glandular-pubescent.
27. Capsule 15-17 mm. long; bracts glandular-pubescent on ribs and margins; galea 15-19 mm. long, finely

pubescent; lip 1.0-1.5 mm. long. . 20. C. CLOKEYI

27. Capsule about 10. mm. long; bracts when pubescent, not glandular; galea 12-15 mm. long, glandular-pubescent dorsally; lip 2 mm. long.

21. C. APLEGATEI

26. Stems glabrous or variously pubescent, never glandular.

28. Bracts with more than 1 pair of lobes, usually 2 or 3 pairs.

29. Plants not over 2 dm. high at maturity; leaves only 25 mm. long, mostly entire.

16. C. CALCICOLA

29. Plants 4-5 dm. high at maturity; leaves longer than 25 mm., mostly with 1 or 2 pairs of lobes.

30. Capsule 12-13 mm. long; lower lip 1.5-2 mm. long; galea 16-23 mm. long; calyx-lobes ovate to linear-oblong. . . 22. C. DOUGLASII

30. Capsule 15-16 mm. long; lower lip 2-3 mm. long; galea 13-15 mm. long; calyx-lobes ovate-obtuse to rounded. . . 23. C. CHROMOSA

28. Bracts with only 1 pair of lobes.

31. Calyx 13-17 mm. long; capsule 11-16 mm. long; leaves linear-lanceolate. . . . 24. C. PRUINOSA

31. Calyx 17-25 mm. long; capsule 10-12 mm. long; leaves narrowly to widely lanceolate.

10. C. MINIATA

12. Corolla 25 mm. or less.

32. Galea longer than the corolla-tube.

33. Bracts entire or with only 1 pair of lobes, occasionally some bracts with 2 pairs.

34. Corolla less than 20 mm. long.

35. Corolla completely included in the calyx.

25. C. TRAINII

35. Corolla at least partly exserted, exceeding the calyx.

36. Calyx-lobes rounded; lower lip of the corolla
4 mm. long. 26. C. CULBERTSONII
36. Calyx-lobes acute or acutish; lower lip of the
corolla 2-3 mm. long. 27. C. CHLOROTICA
34. Corolla 20-25 mm. long.
37. Stems glandular-pubescent; calyx-lobes lanceolate
to oblong-acute or acutish; capsule 10 mm. long;
upper bracts with 1 or 2 pairs of lobes.
21. C. APPLGATEI
37. Stems when pubescent not glandular; calyx-lobes
lance-attenuate; capsule 11-16 mm. long; bracts
with 1 pair of lobes.
38. Stem pubescent, hairs mostly branched; calyx
13-17 mm. long; capsule 11-16 mm. long.
24. C. PRUINOSA
38. Stem mostly glabrous or pubescent with unbranch-
ed hairs; calyx 17-25 mm. long; capsule 10-12
mm. long. 10. C. MINIATA
33. Bracts with more than 1 pair of lobes, or (in applgatei
some of the bracts with only 1 pair).
39. Bracts with both 1 and 2 pairs of lobes on the same
plant. 21. C. APPLGATEI
39. All of the bracts with 2 or 3 pairs of lobes.
40. Bracts purple; corolla usually less than 20 mm.
long; galea about 4 times as long as the lip.
28. C. ANGUSTIFOLIA
40. Bracts variously colored, not purple; corolla
usually more than 20 mm. long, except in
pyramidalis.
41. Galea 13-15 mm. long, 5 or more times longer
than the rudimentary lip which is included in
the calyx. 23. C. CHROMOSA
41. Galea 5-9 mm. long, about 3 times as long as
the exerted lip.
42. Leaves ovate-lanceolate, stems glabrous or
almost so. 29. C. PARVIFLORA

42. Leaves linear-lanceolate to lanceolate;
entire plant beset with soft, white hairs.
30. C. PYRAMIDALIS

32. Galea equal to or shorter than the corolla-tube.

43. Stems glandular-pubescent.

44. Galea 11-15 mm. or longer. 21. C. APLEGATEI

44. Galea 6-10 mm. long.

45. Galea 3-4 times as long as the lip.

46. Corolla much exceeding the 13-15 mm. long calyx.
31. C. BREWERI

46. Corolla only very little exceeding the 15-17
mm. long calyx. 27. C. CHLOROTICA

45. Galea about twice as long as the lip, never as
much as 3 times as long.

47. Calyx-segments lance-linear; galea only 1/3 the
length of corolla-tube; hairs short and stiff.
32. C. VISCIDULA

47. Calyx-segments rounded; galea about equaling or
little shorter than the corolla-tube; hairs
soft. 26. C. CULBERTSONII

43. Stems when pubescent, not glandular (hairs occasionally
gland-tipped in magnistylis).

48. Calyx 10-13 mm. long.

49. Galea 4-5 times longer than the lip.
33. C. SEPTENTRIONALIS

49. Galea about 3 times longer than the lip.
34. C. RUSTICA

48. Calyx 15 mm. or longer.

50. Galea 4-5 times longer than the lip.

51. Bracts shield-shaped. 12. C. HELLERI

51. Bracts lance-ovate to ovate.

52. Bracts 3-cleft, neither crimson nor purple-
tipped.

53. Lobes of the bracts wider than linear.

54. Stigma much enlarged, subhemispherical;
calyx 15-17 mm. long, cleft laterally
4-5 mm. 35. *C. MAGNISTYLIS*

54. Stigma little enlarged; calyx 19-21 mm.
long, cleft laterally 1-2 mm.
36. *C. ELKOENSIS*

53. Lobes of the bracts linear.

55. Upper pair of anthers 2-3 mm. long;
galea as long as the tube.
37. *C. FLAVA*

55. Upper pair of anthers 4 mm. long;
galea shorter than the tube.
38. *C. LATIFOLIATA*

52. Bracts (3-)5-cleft, crimson or purple-tipped.

56. Lower lip 3 mm. long; bracts purple.
28. *C. ANGUSTIFOLIA*

56. Lower lip rudimentary; bracts with green
base and red-tipped lobes.
39. *C. FLAVASCENS*

50. Galea 2-3 times longer than lip.

57. Galea about 3 times longer than the lip.

58. All leaves linear-lanceolate; stems cinerous-
hirsute at the base. . . . 40. *C. CURTICALYX*

58. Leaves varying from linear-lanceolate to
wider; stem glabrous or glandular-puberulent
throughout. 41. *C. RHEXIFOLIA*

57. Galea about twice as long as the lip.

59. Lip about 4 mm. long; bracts varying from
brownish-crimson to greenish-yellow; corolla
about 18 mm. long. . . . 41. *C. OCCIDENTALIS*

59. Lip about 2.5-3 mm. long; bracts greenish-
yellow or greenish-white; corolla 22-24 mm.
long. 42. *C. LUTEOVIRENS*

1. CASTILLEJA MINOR Gray, Syn. Fl. 2:1. Jan. 1886.

C. affinis var. minor Gray.

Annual, up to about 5 dm.; leaves and bracts linear-lanceolate, entire; corolla yellow, galea much shorter than the tube.

Douglas and Washoe Counties.

2. CASTILLEJA EXILIS A. Nels., Proc. Biol. Soc. Wash. 17:100. 1904.

C. stricta Rydb., non Benth.

Rough-pubescent annual; hairs glandless or gland-tipped; stems mostly single up to 8 dm.; leaves lanceolate-attenuate, entire; corolla dull-yellow, margins of galea purplish or reddish.

Distributed generally through the state, open sites at various elevations. Not found in Clark, Esmeralda, Lincoln, Mineral, Storey and Pershing Counties.

3. CASTILLEJA LINOIDES Gray, Syn. Fl. 2:1. Jan. 1886.

C. pallida var. S. Wats.

Rigid perennials up to 3 dm.; leaves linear-lanceolate, up to about 5 cm. long; corolla 12 mm. long.

Elko County.

4. CASTILLEJA PILOSA (S. Wats.) Rydb., Mem. N. Y. Bot. Gard. 1:361. 1900.

Orthocarpus pilosus S. Wats.; Castilleja jusselii Eastw.

Villose-hirsute perennial, hairs glandless, stems clustered, up to 2-5 dm., simple or little branched; leaves almost linear with a pair of divaricate, acute lobes; galea dorsally greenish.

Douglas and Washoe Counties.

5. CASTILLEJA RUBIDA Piper, Bull. Torr. Bot. Club 27:398. 1900.

C. lapidicola Heller.

Glandless, closely pubescent perennial, the clustered stems up to 1 dm., simple, villose in the inflorescence; leaves linear or linear-lanceolate, attenuate, mostly entire, the upper occasionally with a pair of lobes; galea purple; lip greenish with purple lobes.

Humboldt and White Pine Counties.

6. CASTILLEJA RUBIDA var. MONOENSIS (Jeps.) Edwin, L. West. Bot. In press.

C. nana Eastw.; C. inconspicua Nels. & Kenn.; C. ambigua M. E.

Jones non Hook. & Arn.; Orthocarpus pilosus var. monoensis Jepson.

Villose-pubescent, glandless, perennial; stems simple or almost so, up to 2-5 dm.; leaves nearly linear, with a pair of lobes; bracts and calyces distally dull-yellow or dull purplish-red; galea 6 mm. long, dorsally greenish the margins proximally dark-purple and distally white. Open sites. Nye and Washoe Counties.

7. CASTILLEJA PALLESCENS (Nutt.) Greenm., Bot. Gaz. 25:266. 1898.
Orthocarpus pallescens Gray; Euchroma pallescens Nutt. ined.

Minutely pubescent perennial, stems simple, clustered, up to 2 dm.; bracts dark vinaceous-brown; corolla wholly included in the calyx, both about 15 mm. long.

Dry sites. Elko and Washoe Counties.

8. CASTILLEJA PALLESCENS var. INVERTA (A. Nels. & Macbr.) Edwin, L. West. Bot. In press.
C. fasciculata var. inverta A. Nels. & Macbr.; C. pilosa var. inverta A. Nels. & Macbr.; C. inverta (A. Nels. & Macbr.) Pennell and Ownbey.

Differing from the typical as in the key and with the calyx more deeply cleft above than below, its lobes short-bifid.
Humboldt County.

9. CASTILLEJA OBLONGIFOLIA Gray, Syn. Fl. N. Amer. 2, pt. 1. 296. 1878.

Perennial, pubescent, stems ascending, lax, over 5 dm. long; leaves oblong, acute, entire; galea 20-25 mm. long, lip 2 mm. long.

Reported from the State, no specimens seen.

10. CASTILLEJA MINIATA Dougl. ex Hook., Fl. Bor. Amer. 2:106. 1838.
C. pallida var. miniata Gray; C. montana Congd.; C. crispula Piper; C. miniata var. crispula A. Nels. & Macbr.

Perennial, glabrous or pubescent, stems clustered, simple or branched; bracts and calyces variously distally red, from dull to bright, from red to flame scarlet; corolla 20-35 mm. long; galea 10-20 mm., attenuate with blunt apex, lip 1-2 mm. dark-green, protuberant, incurved; capsule 10-12 mm. long.

Common at various elevations in shaded or open sites. Throughout the State except Churchill, Clark, Douglas, Lincoln, Lyon, Ormsby, Pershing and White Pine Counties.

11. CASTILLEJA RHEXIFOLIA Rydb., Mem. N. Y. Bot. Gard. 1:356. 1900.
C. lauta A. Nels.; C. obtusiloba Rydb.; C. humilis Rydb.

Perennial, up to 4 cm.; glabrous below, more or less villose above;

leaves oblong-lanceolate to ovate, upper often shallowly 3-5 cleft; bracts bright-scarlet; calyx scarlet, equally cleft; corolla about 30 mm. long; galea about 10 mm. long.

Probably occurring in Nevada in the Jarbidge Mts., Elko County.

12. *CASTILLEJA HELLERI* Edwin, L. West. Bot. 9:43. 1959.

Perennial, stem branched from the base about 5 dm. high, puberulent with white hairs; leaves lanceolate, lance-ovate to narrowly ovate, margins ciliate, entire, herbage glabrous or finely puberulent; bracts red-tipped, 3-lobed from above the middle, the lateral pair lanceolate, the middle lobe ovate, the entire bract shield-shaped; calyx about 18 mm. long, subequally cleft dorsally and ventrally about $\frac{1}{3}$ the length of the calyx; the lateral cleavages 4-6 mm. long, lanceolate to lance-ovate, attenuate, tissue puberulent, margins ciliate; corolla 20-25 (-28) mm. long, tube longer than the slender, 7-9 mm. long, galea which is dorsally puberulent with short hairs, the lip about 2 mm. long, callosed, little if at all saccate; 2 pairs of stamens subequal, glabrous; style glabrous; stigma slightly bilobate, little wider than long; capsule about 15 mm. long, flattened; seeds numerous, about 2 mm. long, the loose testa reticulate.

Known only from type, Mt. Rose, Washoe County.

13. *CASTILLEJA HISPIDA* Benth. ex Hook., Fl. Bor. Amer. 2:105. 1838.

Herbaceous perennial, hirsute with glandless hairs, inflorescence villose; stems up to 4 dm.; leaves lanceolate to ovate, distally with 2-3 pairs of lobes; bracts and calyces distally red or scarlet-red, varying to orange; calyx-lobes rounded; galea 12-15 mm. long, dorsally very short-pubescent; lip 1-2 mm. long, dark-green, rudimentary.

Not found in Nevada but included because of the following subspecies. Occurrence of this taxon may be considered probable.

14. *CASTILLEJA HISPIDA* subsp. *ACUTA* Pennell, Not. Nat. No. 74:11. 1941.

Differing from the typical as in the key.
Humboldt County.

15. *CASTILLEJA BARNEYANA* Eastw., L. West. Bot. 3:4. 1941.

Stems up to 1 dm., simple, canescent; leaves graying, 2-5 parted; bracts flabelliform, 3-7 parted; flowers 35 mm. long; galea about 10 mm. long, shorter than the tube.

Elko and White Pine (the type) Counties.

16. *CASTILLEJA CALCICOLA* Pennell ex Edwin, L. West. Bot. 9:45. 1959.

Small, stems clustered woody at base up to 1.5-2.0 dm., pubescent with short, white hairs, leaves pubescent with short, white hairs, linear to linear-lanceolate short, up to 25 mm. mostly much less, entire or the broader one with a pair of linear lobes, sometimes leaves fasciculate; inflorescence a very dense head-like spike, pubescent; bracts pubescent and ciliate margined, with 2 pairs of lance-attenuate, pointed lobes, 1 pair from the base and the other from near the apex, all the sinuses large; calyx deeply cleft medianly about halfway above and more than halfway (about $\frac{3}{4}$) below, laterally shallowly cleft into short lobes about 2-3 mm. long, entirely beset with cilia on the margins, somewhat puberulent on the tissue below, 22-26 mm. long; corolla 30-32 mm. long, galea 16-19 mm. long, exceeding the tube, dorsally puberulent, lip 2-3 mm. long, very saccate, inflated, callosed, the 3 teeth incurved, genitalia exserted; capsule 9-10 mm. long, ovoid, seeds 1.0-1.5 mm. long, surrounded by an hyaline, reticulate appendage.

Apparently not closely related to any western United States species. Its dense inflorescence precludes placement in the Linariaefoliae. The unequal median splitting of the calyx prevents putting it in the Chromosae. Superficially the taxon resembles C. rupicola Piper.

Known only from the type, White Pine County.

17. CASTILLEJA LINARIAEFOLIA Benth. in A. DC. Prod. 10:532. 1846.

C. candens Dur. & Hilg.; C. affinis var. linariaefolia Zeile; C. salticola Eastw.; C. howellii Eastw.

Perennial, glabrous to variously pubescent, stems up to 8 dm., with spreading, pilose pubescence at base, simple or little branched; bracts and calyces distally rose to scarlet-red, bracts with 1 or 2 pairs of lobes; calyces cleft laterally into lance-attenuate lobes 6-7 mm. long; galea 20-23 mm. long, dorsally pubescent, lip 3 mm. green, rudimentary.

Throughout the State except Ormsby and Pershing Counties, where it is still to be collected.

18. CASTILLEJA LINARIAEFOLIA f. OMNIPUBESCENS Pennell, Proc. Acad. Nat. Sci. Phila. 89:424. 1938.

C. linariaefolia var. omnipubescens (Pennell) Clokey.

Differing from the typical as in the key.
Charleston Mts., Clark County.

19. CASTILLEJA SUKSDORFII Gray, Proc. Amer. Acad. 22:311. 1887.

Perennial, rhizomatose, pilose to glabrescent below the villose inflorescence; stems up to 7 dm., simple or slightly branched; leaves entire or upper with 1 pair of lobes; bracts and calyces with 1-3 pairs of attenuate, sharp-tipped lobes, distally scarlet with yellow band separating basal portion; corolla 30-40 mm. long, galea 20-25 mm. long, lip 2 mm. long; capsule 12-13 mm. long.

Elko County.

20. CASTILLEJA CLOKEYI Pennell, Proc. Acad. Nat. Sci. Phila. 89:119. 1937.

Perennial, stems up to 6 dm., pubescent with glandular and glandless hairs; leaves lanceolate or oblong-lanceolate, lower entire, upper with 1 or 2 pairs of lobes; bracts shorter than leaves, with 1 or 2 pairs of slender lobes, glandular-pubescent on the tissue, villose on the ribs and margins; calyx 17-20 mm., cleft $1/3$ medianly, less laterally; corolla 25-30(-40) mm. long; tube included in calyx, galea 15-19 mm., dorsally greenish-yellow, lip rudimentary 1.0-1.5 mm. long; anthers yellow exceeding galea; capsule 15-17 mm. long.

Endemic in the Charleston Mts., Clark County.

21. CASTILLEJA APPLIGATEI Fern., Erythea 6:49. 1898.

C. angustifolia var. adenophora Fern.; C. pinetorum Fern.; C. brooksii Eastw.; C. trisecta Greene; C. pinetorum var. fragilis Zeile; C. roseana Eastw.; C. excelsa Eastw.; C. dolichostylis Eastw.; C. hoffmannii Eastw.

Perennial, stems glandular-pubescent and in the inflorescence mixed villose-glandular, clustered, simple to much-branched, up to 6 dm.; leaves entire to lobed; bracts and calyces distally scarlet, varying to orange and occasionally yellowish, at least upper bracts with 1 or 2 pairs of slender lobes; calyx $1/2$ medianly, 2-4 mm. laterally; galea 12-15 mm., lip 2 mm., thickened; capsule 10 mm. long.

Open sites, 6,000-9,500 ft. Douglas, Elko, Humboldt, Lincoln and Washoe Counties.

22. CASTILLEJA DOUGLASII Benth. in A. DC. Prod. 10:530. 1846.

C. multisecta Eastw.; C. polytoma Eastw.

Perennial, pilose, glandless; inflorescence hirsute; stems ascending or erect, simple or little branched up to 5 dm.; leaves with 1-3 pairs of lobes; bracts distally scarlet or scarlet-red with 2-3 pairs of lobes; calyx 18-25 mm. scarlet or scarlet-red, lobes 3-7 mm. long, ovate to linear-oblong; corolla (25-)30-37 mm., galea 16-23., dorsally finely-pubescent, lip to 1.5-2.0 mm.; capsule 12-13 mm.

Humboldt County.

23. CASTILLEJA CHROMOSA A. Nels., Bull. Torr. Bot. Club 26:245. 1899.

Perennial, herbaceous, hispid-hirsute, hairs glandless, spreading, branches erect up to 4 dm.; leaves distally with 1 or 2 spreading, slender lobes; bracts with 2 pairs of slender lobes, scarlet-red; calyx scarlet-red, 20-21 mm.; corolla 25 mm., galea 13-15 mm., lip 2-3 mm.,

included within calyx-tube; capsule 15-16 mm. long.

Dry open sites at higher elevations. Distributed throughout the State, except Douglas, Lincoln, Lyon, Ormsby, Pershing and Storey Counties.

24. CASTILLEJA PRUINOSA Fern., Erythea 6:50. 1898.

C. nevadensis Eastw.; C. globosa Eastw.; C. muscipula Eastw.; C. muscipula var. armeniaca Eastw.; C. muscipula var. angustifolia Eastw.

Perennial, pubescent with mostly branched hairs, stems usually branched, herbaceous up to 7 dm.; leaves linear-lanceolate mostly entire, upper occasionally with 1 pair of lobes; bracts and calyces distally scarlet-red or scarlet.

Reported from the State, no specimens seen.

25. CASTILLEJA TRAINII Edwin, L. West. Bot. 9:43. 1959.

Corolla and genitalia completely included in the overtopping calyx (occasionally the stigma exserted); stems up to 7 dm., single, branched near the top, glabrous over most of the length, pubescent with short, white, glandless hairs below the inflorescence, and with mixed glandular and glandless, short, white hairs at the inflorescence; leaves glabrous, linear to linear-lanceolate, mostly entire, the lowest about 5 cm. long, much reduced above, the upper occasionally with 1 lobe; bracts 3-lobed from below the middle, center lobe lanceolate-attenuate, outer pair linear-lanceolate, each with one nerve, puberulent with short, white hairs on the nerves and margins; calyx 15-20 mm. long, sparsely pubescent with short, white hairs, cleft very unevenly medianly to below the middle adaxially (above) and only 3-4 mm. abaxially (below), the lateral cleavages very short, 1.0-2.5 mm., the teeth acute to acuminate; corolla 9-16 mm. long, glabrous throughout; galea 6-9 mm. long, always much longer than the tube; lip 1-2 mm. long, somewhat inflated and little callosed, the 3 teeth acute; filaments short, little exceeding the corolla-tube; style glabrous often exceeding the corolla; stigma longer than broad, bilabiate.

A very unusual Castilleja in the typical subgenus. The unequally cleft calyx indicates the section Castilleja. However, the included corolla and genitalia, galea exceeding the corolla-tube, and the smallness in length of the corolla make it necessary to propose a new sub-section Trainianae, in which this taxon is placed. The taxa in the sub-section Linariaefoliae, which is nearest to Trainianae, have excluded corollas, tubes longer than galeas, and corollas (25-) 30-45 mm. long. The only near relative to this taxon in the United States is C. linariaefolia Benth, but the relationship is not close enough to place trainii in the same sub-section.

Known only from the type, Elko County.

26. *CASTILLEJA CULBERTSONII* Greene, Leaf. Bot. Obs. 1:78. 1904.

Perennial, glandular-pubescent below the inflorescence, stems up to 2 dm.; the upper leaves sometimes with 1 pair of short lobes, otherwise leaves entire; bracts and calyces distally purple, upper bracts with 1 or 2 pairs of lobes; calyx 16-18 mm.; corolla 17-19 mm., galea 8-10 mm., attenuate-tipped, lip 4 mm.; capsule 5-9 mm. long.

Washoe County, rare.

27. *CASTILLEJA CHLOROTICA* Piper, Proc. Biol. Soc. Wash. 33:104. 1920.

Perennial, stems simple, finely glandular-pubescent, up to 2 dm.; leaves entire or upper with 1 pair of lobes; bracts and calyces distally yellow, bracts trilobate; calyx 15-17 mm.; corolla 16-18 mm., galea 9 mm., margins purple, lip 2-3 mm. long.

Open sites, 10,000 ft. Elko County.

28. *CASTILLEJA ANGUSTIFOLIA* (Nutt.) G. Don, Hist. Dichlam. Pl. 4:616. 1838.

Euchroma angustifolia Nutt.; *Castilleja parviflora* Bong. in part;
Euchroma bradburii Nutt.; *Castilleja bradburii* Don.; *C. bennittii*
A. Nels. & Macbr.

Perennial; inflorescence usually elongate; otherwise differing from *C. chromosa* A. Nels., as in the key.

Generally distributed as to site and elevation in all counties of the State.

29. *CASTILLEJA PARVIFLORA* Bong., Mém. Acad. St. Petersb. Ser. 6, 2: 1840.

Stems glabrous or almost so, up to 4 dm.; leaves 2-4 cm. long; bracts red or reddish; galea 5-8 mm. long, dorsally pubescent.

C. parviflora Bong., is a most variable species. At the northern edge of its range the corollas are about 15 mm. long, but in ours a good deal longer. The relationship of the galea to the lip, however, remains fairly fixed, about 3 times as long. Pennell in Proc. Acad. Nat. Sci. Phila. 89:119-124. 1937, has presented an interesting analysis of this and several related species. He restricted *parviflora* to a more northern limit. Ownbey in his Rocky Mountain *Castilleja* (1936, unpublished thesis), also excluded *parviflora*. It is retained here at least provisionally until a complete study covering the range of the taxa in *Castilleja* can be accomplished.

Washoe County. Possibly in Elko, Mineral and Nye Counties also.

30. *CASTILLEJA PYRAMIDALIS* Edwin, L. West. Bot. 9:44. 1959.

Perennial, stems branched from the base, about 4 dm. high; entire plant beset with soft, white hairs; lower leaves mostly entire becoming variously incised above, with 2-5 lobes, linear-lanceolate to lanceolate, margins entire and ciliate; bracts red, base green, with 2 (occasionally 3) pairs of lobes (5- rarely 7- cleft), a pair from near the base, lanceolate, a pair from near the apex short, narrowly lance-ovate, all margins ciliate, about 17 mm. long; calyx cleft about 3/4 dorsally, about 1/3 ventrally, the lateral cleavages very short, about 1.0-1.5 mm.; corolla about 19 mm. long; galea little longer than tube (about 10 mm.), lip about 3 mm. long, callosed, saccate; the 2 pairs of filaments almost equal in length, glabrous, anthers glabrous, exserted; stigma bilobate, wider than long; style glabrous; capsule inflated, about 15 mm. long, apiculate-tipped.

Closest to C. hispida Benth. in the Chromosae from which pyramidalis differs in its smaller flowers, larger lip in relation to the galea, and small lateral calyx-teeth.

Known from the type only, Pyramid Lake, Washoe County.

31. CASTILLEJA BREWERI Fern., Erythea 6:49. 1898.

C. peirsonii Eastw.; C. adenophora Eastw.

Perennial with mixed glandular and eglandular pubescence, stems up to 2 dm. tall; leaves mostly entire, upper occasionally with a pair of slender lobes; bracts and calyces distally scarlet or scarlet-red; bracts with a pair of lobes; calyx 13-15 mm.; corolla 16-22 mm., galea 7-10 mm., lip 2-3 mm.; capsule 9-11 mm. long.

Reported from the State, no specimens seen.

32. CASTILLEJA VISCIDULA Gray, Syn. Fl. 2:1. 297. 1878.

C. covilleana Henderson; C. viscida Rydb.

Perennial from a woody caudex, viscid-glandular and eglandular pubescent, up to 3 dm.; leaves usually with 1 or 2 pairs of lobes, viscid; bracts with 1 or 2 pairs of lobes, tipped with crimson, scarlet or occasionally yellow; calyx unequally cleft medianly, lobes deeply cleft into lanceolate, acute segments; corolla yellowish, galea red-margined, lip inconspicuous.

Elko, Humboldt, Mineral, Washoe and White Pine Counties.

33. CASTILLEJA SEPTENTRIONALIS Lindl., Bot. Reg. 11:pl. 925. 1825.

C. pallida var. septentrionalis Gray.

Perennial, stems finely-pubescent to glandular, simple, up to 3 dm.; inflorescence villose; bracts and calyces distally yellowish; lower bracts entire, upper with a pair of lobes; calyx about 12 mm.; corolla 14-18 mm., galea 6-7 mm. attenuate, dorsally puberulent, lip 2 mm.; capsule 9-10 mm. long.

Washoe County. Various open sites.

34. CASTILLEJA RUSTICA Piper, Bull. Torr. Bot. Club. 27:398. 1900.

Perennial; inflorescence villulose to villose; stems 1.5-2.0 dm.; bracts and calyces distally yellow; bracts with 1 pair of lobes; calyx 10-13 mm.; corolla 18 mm., galea 7 mm., margins thin reddish, lip 3 mm.; capsule 10 mm. long.

Washoe County, rare.

35. CASTILLEJA MAGNISTYLIS Edwin, L. West. Bot. 9:47. 1959.

Small, branched perennial, up to 1.5 dm., stems and foliage densely beset with short to long white hairs, occasionally some gland-tipped; leaves short, mostly entire, lanceolate to lance-ovate; inflorescences spike-like, short, usually terminating the branches; bracts green with a pair of lanceolate, lateral lobes from smaller than to exceeding the broad middle one; calyx narrow up to 17 mm. long, green, subequally cleft medianly about 1/2 to 3/5 its length, cleft laterally into lanceolate-attenuate 4-5 mm. long lobes; corolla 21-23 mm. long, yellow to greenish-yellow, dorsally very short puberulent on the 8-10 mm. long galea, lip about 2 mm. long, saccate; stamens glabrous; stigma much enlarged sub-hemispherical, brown when dry, style glabrous.

Nearest to the Fraternae from which it differs in bract and calyx color, flower size and in the stigma. Nevertheless the taxon is provisionally placed therein.

Elko County, known from the type only.

36. CASTILLEJA ELKOENSIS Edwin, L. West. Bot. 9:47. 1959.

Erect perennial, branching from the base, up to 4 dm., branches glabrous, purple-tinged terminated by a relatively long (up to 15 cm.) tight, spike-like inflorescence; herbage glabrous, leaves lance-linear to lanceolate, up to 9 cm. long, upper with a pair of thin lobes, others entire, somewhat clasping at the base; bracts with a pair of lobes, soft-ciliate on the margins and sometimes on the tissue below with short, white hairs, the lanceolate lobes yellowish (at least when dried), base green, center lobe little broader and usually with a rounded apex; calyx 19-21 mm. long, cleft subequally about halfway medianly and only 1 or 2 mm. laterally, soft-ciliate on the margins; corolla 22-25 mm. long, externally puberulent dorsally on the galea and upper part of the tube, galea a little shorter than the tube, 9-11 mm. long, lip about 3 mm. long, somewhat simulating a miniature bract, the teeth slightly or not callosed; stamens and style glabrous; stigma slightly enlarged, bilobate, ovoid; capsule 13-15 mm. long, lance-ovoid, seeds numerous, apiculate at one or both ends, 1.5-2.0 mm. long, with a reticulate, hyaline, somewhat clasping testa.

A very perplexing taxon, difficult to place effectively, having characteristics of the Fraternae, Miniatae and Chromosae but differing from each in one or more ways. Its somewhat unusual lower lip and inflated stigma are striking.

Elko County, known from the type only.

37. CASTILLEJA FLAVA S. Wats., Bot. King's Expl. 5:230. 1871.

C. brachyantha Rydb.; C. breviflora Gray; Euchroma breviflora Nutt.

Perennial, stems pubescent to glabrate up to 4 dm.; leaves pubescent, entire below with 1 or 2 pairs of lobes above; bracts cleft, distally yellow or yellowish-red; calyx unequally cleft laterally; corolla 15-30 mm., galea about 1/2 as long as the tube, lip about 1/4 as long as the galea.

Open sites, 6,500-9,500 ft. Elko and Humboldt Counties.

38. CASTILLEJA LATIFOLIATA Pennell ex Edwin, L. West. Bot. 9:46. 1959.

Stem woody at base up to 4 dm., covered with short, white hairs; herbage pubescent with short, white hairs, leaves 3-lobed near the apex, linear-lanceolate; inflorescence with longer hairs, a few gland-tipped; bracts 3-lobed from below the middle, lateral lanceolate, middle one broader, all ciliate on margins and veins from less than to exceeding the sessile flowers; calyx 16-18 mm. long, pubescent, cleft about half-way medianly below, less above and laterally into lanceolate lobes 4-6 mm. long, with short acute tips; corolla 19-23 mm. long; galea dorsally pubescent, 8-11 mm. long, shorter than the tube, with thickened margins; lower lip externally puberulent, 2-3 mm. long, lateral teeth exceeding middle one; anthers, filaments, style and stigma glabrous, larger anthers 4 mm. long; capsule lance-ovoid 17 mm. long; seeds numerous, pointed at one end, ovate 1-2 mm. long, covered with a hyaline, reticulate testa.

Seemingly its closest native relative is C. flava from which it can be distinguished by the external pubescence of the corolla and larger anthers and capsule.

Washoe County, known from the type only.

39. CASTILLEJA FLAVASCENS Pennell ex Edwin, L. West. Bot. 9:45. 1959.

Stem woody at the base about 7 dm. tall, with scattered, short, white hairs below, densely beset with long, soft, white above and in the inflorescence; leaves up to about 8 cm. long, lanceolate, pubescent with short hairs, somewhat clasping at the base, entire, sinuate, upper smaller sometimes with a pair of short, acute lobes; flowers in a dense spike, sessile; bracts about 2 cm. long, with 5 red-tipped, green based lobes, the two lateral long and awl-shaped, inner two short, center one broadest, all short-acute tipped, margins pubescent and ciliate, tissue glabrous, usually over-topped by the calyx and corolla; calyx 17-19 mm. long, margins pubescent, short cleft medianly (little more ventrally than dorsally) and very little cleft laterally into short-triangular lobes, about 2 mm. long; corolla 20-22 mm. long, glabrous, galea 10-11 mm., lower lip rudimentary, tube about equal to galea in length;

genitalia exerted; the 2 pairs of stamens glabrous, subequal; the stigma and style glabrous, stigma flattened; capsule 11 mm. long, ovoid; seeds 1.0-1.5 mm. long, about 0.5 mm. wide, triangular to sub-ovate, surrounded by a reticulate, hyaline, prismatic, wing-like appendage.

Close to C. angustifolia (Nutt.) Don from which it differs in its much taller stems, longer leaves, shorter corolla lip and calyx smaller than the corolla.

Known from the type only, White Pine County.

40. CASTILLEJA CURTICALYX A. Nels. & Macbr., Bot. Gaz. 55:380. 1913.

Perennial, stems up to 4 dm., simple or nearly so, soft cinerous-hirsute below, glabrate above; leaves entire or with 1 pair of lobes; bracts resembling the leaves; calyx 15 mm., medianly subequally cleft, laterally divided into long teeth; corolla 20-25 mm., galea 7-10 mm. long, lip with short center tooth.

Elko County, rare.

41. CASTILLEJA OCCIDENTALIS Torrey, Ann. Lyc. N. Y. 2:230. 1828.

C. pallida var. occidentalis Gray; C. pallida var. alpina Porter;
C. pallida f. tincta Cockerell; C. pallida f. lobata Cockerell;
C. parvula Rydb.

Perennial, stems up to 2 dm., glabrous below to pilose above; leaves entire below with 1 pair of lobes above; bracts entire or with 1 pair of lobes; calyx about 20 mm., subequally cleft medianly, cleft laterally into rounded segments; corolla blackening on drying, exceeding 20 mm., galea less than 1/2 the tube, 3-4 times as long as the lip.

Washoe County, rare.

42. CASTILLEJA LUTEOVIRENS Rydb., Bull. Torr. Bot. Club 28:26. 1901.

C. sulphurea Rydb.

Differing from C. occidentalis as in the key. Possibly a synonym for that taxon, but provisionally retained until specimens are available.

14. CORDYLANTHUS Nutt. ex Benth.

A. DC. Prod. 10:597. 1846.

Annual herbs, stems branched, leaves alternate, entire or dissected, inflorescence an elongated or abbreviated spike (head-like cluster) of dull yellow or purple flowers; subtending bracts varying from leaf-like to seemingly part of the calyx; ebracteolate; sepals of the calyx united into one piece, which is split nearly or quite to the base ventrally but dorsally extends as a tongue-like structure that is either bifid or entire at the apex; corolla 2-lipped, the upper galeate, the lower shorter than, as long as or a little longer than the upper, somewhat inflated

with minute lobes; stamens 4 or 2, anther cells unequally placed, the lower sometimes smaller or aborted; capsule turgid, glabrous, loculicidal; seeds many, wingless, reticulate.

1. At least some of the leaves and bracts entire, leaves wider than linear.
 2. Leaves and bracts usually all entire.
 3. Inflorescence a spike; corolla 15-17 mm. long. .1. C. CANESCENS
 3. Inflorescence a cluster; corolla 12-13 mm. long. . 2. C. TENUIS
 2. Some of the leaves pinnatifid; or some bracts 3-lobed.
 4. Inflorescence spike-like, loose; corolla 9-11 mm. long.
 3. C. TECOPENNIS
 4. Inflorescence a head-like cluster, tight; corolla 14-20 mm. long.
 5. Corolla 14-15 mm. long; filaments and anthers ciliolate.
 4. C. GLANDULOSUS
 5. Corolla 15-18 (20) mm. long; filaments and anthers glabrous.
 5. C. NEVADENSIS
 1. Leaves and bracts variously lobed or toothed (few of the leaves entire, then narrowly-linear).
 6. Stamens 2. 6. C. CAPITATUS
 6. Stamens 4.
 7. Corolla less than 20 mm. long.
 8. All of the anthers alike. 7. C. RAMOSUS
 8. Anthers of the shorter filaments smaller than those of the larger. 8. C. PARVIFLORUS
 7. Corolla 20 mm. or longer.
 9. Bracts with filiform, irregular lobes. 9. C. KINGII
 9. Bracts with regular, linear lobes. 10. C. HELLERI

1. CORDYLANTHUS CANESCENS Gray, Proc. Amer. Acad. 7:383. 1868.
Cordylanthus parryi S. Wats.; Adenostegia canescens Greene; A. parryi Greene; Chloropyron canescens Heller; C. parryi Heller;

Cordylanthus maritimus var. canescens Jepson; C. maritimus var. parryi Jepson.

Plant 2-3 dm. tall, corymbosely much branched, the young herbage pubescent with spreading fine hairs that exude a powdery whitish secretion, becoming purplish and glabrescent; leaves and bracts glaucous-green, the former lanceolate and glabrescent, the latter ovate-lanceolate or ovate, canescent-pubescent, foliaceous; calyx 13 mm. long, canescent, lanceolate, enclosing proximal part of the corolla-throat distally with sharp teeth about 0.5 mm. long; corolla 15-17 mm. long, its galea concave-rounded, minutely pubescent dorsally, pale-yellow, and with wide pale thin margins, its lower lip with pinard-yellow slightly inflated distally pubescent pouch and with minute glabrous rounded lobes; stamens 4, the slender upper filaments with reduced or rudimentary anthers, the lower thicker and longer, with fused anthers; capsule 10 mm. long.

Open sites. Douglas, Esmeralda and Washoe Counties.

2. CORDYLANTHUS TENUIS Gray, Proc. Amer. Acad. 7:383. 1868.

Adenostegia tenuis Greene; Cordylanthus pilosus var. tenuis Jepson.

Plants 3-6 dm. tall, with broom-like ascending-spreading branches, the stem glabrous or bifariously minutely pubescent, the mostly involute leaves finely pubescent especially on the upper surfaces, the plants not glandular; leaves linear to filiform-linear, entire, obtuse or obtusish; inflorescence of clustered flowers, each 1-3 flowered cluster subtended by several filiform-linear outer bracts that are only slightly or not enlarged though often slightly callosed, the outer bracts, flowering bract, and calyx minutely ciliolate; flowering bract 13-14 mm. long, distally violet-purple, oblong, obtuse or acutish; calyx 14-15 mm. long, similarly colored, narrowly lanceolate, distally entire or slightly bifid; corolla 12-13 mm. long, its throat abruptly horizontally widened, laterally, violet-purple, slightly paler dorsally and chalcedony-yellow ventrally, apparently not streaked nor strongly lined, its galea brown, distally dark-purple, dorsally puberulent, laterally with pale-yellow membranous margins, its lower lip wider, expanded obscurely trisaccate, light chalcedony-yellow, externally obscurely finely pubescent, internally glabrous, distally channelled and with incurved obsolescently lobed margins that are abruptly everted and yellow; stamens 4, the anthers alike and the filaments all bearded; capsule 7 mm. long.

Douglas and Washoe Counties.

3. CORDYLANTHUS TECOPENSIS Munz and Roos, El Aliso, 2(3):233-234. 1950.

Grayish glandular annual, erect, 3-6 dm. high, diffusely excurrent-ly branched throughout, the stems somewhat purplish to green, glaucous, the branchlets 0.5 mm. thick, the main stem to 3 mm. in diameter, all scattered-pubescent with very short rather coarse, spreading to retrorse, mostly gland-tipped hairs; leaves glaucous, those of the main stems

lance-linear to narrowly lance-oblong, 5-15 mm. long, 1-2 mm. wide, sessile, acute to obtusish, fleshy, glandular and somewhat glandular-pubescent, but not gland-tipped, gradually reduced up the stems, those of the branchlets numerous, 3-6 mm. long and passing through entire lanceolate bracts into sessile, narrowly ovate, glandular-scaberulous bracts 10-12 mm. long, 3-4 mm. wide, acuminate but not gland-tipped, with a pair of linear lobes about 2 mm. long near their middle, each lobed bract obscurely 5-nerved and subtending a flower above which and opposite to the bract is a second entire, lanceolate, acuminate structure, the "calyx-leaf", 10-13 mm. long, both bracts green and forming a somewhat tubular and calyx-like structure; flowers several, axillary, forming loose spikes 2-5 cm. long; corolla pale-lavender, ca. 1 cm. long, the tube 3-4 mm. long, the limb with two subequal lobes 4-5 mm. long and ca. 3 mm. wide, purple-veined, pubescent, with some hairs gland-tipped; stamens 4; filaments glabrous the upper pair without anthers and included in the throat, lower pair fertile, extending to the tip of the corolla, the filaments dilated; anthers 2-celled, the lower cell ca. 1 mm. long, the upper ca. 2 mm. long, slightly pubescent especially at the ends; style filiform, pubescent; capsule oblong, 7-8 mm. long; seeds several, greenish, ca. 1 mm. long, with yellowish loose reticulate coat.

Nye County.

All the material seen from Nevada differs from the original description in having a notched apex on the "calyx-leaf", and in flowers and seed color as well as in some very minor respects. Since the specimens were collected and determined by Roos the occurrence of tecopensis is provisionally accepted. The taxon so designated here could well be undescribed.

4. *CORDYLANTHUS GLANDULOSUS* Pennell and Clokey, Proc. Acad. Nat. Sci. Phila. 90:11. 1938.

Annual; tap root yellow; herbage glandular-pubescent, the glands yellow; stem 1.5-3.5 dm. tall, much branched, the branches ascending glandular-hirsute throughout; leaves green or somewhat purplish, densely glandular-pubescent; the lowermost broadly linear (2 mm. wide), obtuse; those of the main stem mostly trifid, 1.5-2.5 cm. long, the divaricate lateral lobes somewhat shorter, all lobes obtuse, about 1 mm. wide, the wider united base 2-5 mm. long; those of the branches smaller, shorter-lobed or entire; head-like inflorescences terminating the stem and branches, although some may appear axillary due to subsequent development of lateral branches; clusters containing from 1-6 flowers; involucre bracts 2 or 3, with 3-5 linear lobes; subtending calyx-like bract 11-12 mm. long, entire, 3-ribbed, white-ciliate, the tip decurved and rounded; calyx slightly longer, 12-13 mm. long, not ciliate, at apex bifid-notched, the lobes 0.5-2.0 mm. long, acute or obtuse; both calyx and calyx-like bract dull green or violet-purplish, proximally white-hirtous, distally minutely glandular-pubescent; corolla 14-15 mm. long; tube narrow, yellow; throat inflated, widely expanded horizontally and somewhat trisaccate beneath, violet-purple posterior lip sagittally narrow, distally pale-yellow, glabrous like the posterior side of the throat, the distal side

of the apex hooded; anterior lip slightly shorter than galea, broadly tapering to an everted bright yellow tip, its lower (outer) surface proximally violet-purple and white-pubescent like the anterior side of the throat; stamens 4, didynamous, the flattened filaments ciliate; anthers 2-celled, yellow, each ciliolate; stigma protruding down from hooded apex of galea; capsule about 7-8 mm. long, glabrous; seeds 1.0-1.5 mm. long, brownish, the testa finely alveolate-reticulate with white lines. Endemic in the Charleston Mts., Clark County.

5. *CORDYLANTHUS NEVADENSIS* Edwin, L. West. Bot. 9:48. 1959.

Perennial, green with purple tinge; stem branched above the base up to about 4 dm. entirely beset with white hairs that increase in length and density toward upper part; spikes of 1-3 sessile flowers; leaves mostly entire, green, lanceolate 1- or occasionally 3-nerved, sometimes with fascicles of smaller leaves in axes, margins slightly thickened, often purplish; bracts (except those immediately below the flowers which are entire) 3-lobed from below middle, lateral lobes short, linear-lanceolate, middle one long-lanceolate; calyx purple-tinged, entire, on one side, from shorter to longer than the corolla; corolla 15-18 (-20) mm. long, tube yellow, lip purple or with purplish markings and stripes, lips equal or almost so, when subequal either may exceed the other, lower externally pubescent (otherwise both glabrous) saccate, tube longer than lips; stamens 2, 1-celled, glabrous; stigma and style included, glabrous; capsule about 8 mm. long, seeds 2-3 mm. long, smooth.

Elko County, known from the type only.

6. *CORDYLANTHUS CAPITATUS* Nutt. ex Benth. in A. DC. Prod. 10:597. 1846.
Adenostegia capitata Greene.

Plants 2-3 dm. tall, with many spreading branches, loosely pubescent with glandless hairs on stem, more glandular distally and on foliage; leaves linear or narrowly linear, obtuse, those of the main stem mostly with a pair of lobes and the lower with subtended leafy fascicles, those of the branches entire, few and remote; inflorescence of 2-4-flowered head-like clusters, subtended by several obtuse or acutish outer bracts, each with a pair of divaricate short linear-attenuate lobes; flowering bract 11-12 mm. long, purple (pale with dark ridge-lines), oblong, acutish; calyx 8-9 mm. long, purplish, lanceolate, at apex bifid, the lance-attenuate lobes 2 mm. long; corolla 11-12 mm. long, erect, straight or nearly so, purple, its throat moderately inflated, its galea narrow, dorsally finely pubescent and dark purple, the decurved apex connected evenly with the wide pale membranous margins, its lower lip usually slightly shorter than upper, slightly pouched, externally pubescent over entire width with reflexed-spreading hairs, yellowish, with glabrous slightly everted tip (of lowermost lobe); stamens 2 (only the lower pair present), the filaments glabrous, distally with widened decurved portion, the anthers 1-celled, pubescent on dehiscing surface; capsule 6 mm. long.

Dry open sites. Elko, Mineral and Nye Counties.

7. *CORDYLANTHUS RAMOSUS* Nutt. ex Benth. in A. DC. Prod. 10:597. 1846.
Adenostegia ramosa Greene.

Plants mostly 2-3 dm. tall, erect, slenderly much-branched, the herbage grayish-puberulent with fine recurved-spreading glandless hairs; leaves filiform, involute, entire or with a pair of filiform lobes; inflorescence shortly spicate or head-like, or 3-5 flowers, subtended by 5-lobed outer bracts; flowering bracts 14-15 mm. long, oblong-lanceolate, entire, obtuse or rounded at apex; calyx 14-15 mm. long, narrowly lanceolate, bidentate (0.5 mm.) at apex; corolla 15-17 mm. long, brownish-yellow, its galea dorsally minutely pubescent but distally yellow and glabrous, with hardened decurved apex and with membranous margins, its lower lip with horizontally widened, moderately inflated, finely pubescent yellowish pouch that is internally medianly pubescent, and with very short rounded lobes of which the median is widest and everted; stamens 4, the anthers alike and the filaments all bearded; capsule 8 mm. long.

The most widely distributed species in Nevada, found in Clark, Douglas, Elko, Lander, Mineral, Nye, Ormsby, Storey and White Pine Counties.

8. *CORDYLANTHUS PARVIFLORUS* (Ferris) Wiggins, Contr. Dudley Herb. 1:174. 1933.

Adenostegia parviflora Ferris.

Plants 2-4 dm. tall, with many ascending branches, glandular-pubescent throughout; leaves linear or broadly linear, obtuse, those of the main stem mostly trifid; inflorescence of 1-3-flowered head-like clusters, subtended by several 3-lobed outer bracts (the segments obtuse or rounded); flowering bract 11-12 mm. long, purplish (as is often the entire plant), oblong, rounded; calyx 12-13 mm. long, purplish, lanceolate, slightly bidentate; corolla 15-16 mm. long, inverted, purple, its upcurved throat seemingly decurved, horizontally flattened, mallow-purple (or somewhat lighter) distally on the anterior exposed side, upper side of corolla glabrate but with 2 fine lateral lines of pubescence, its galea ascending though seeming deflexed, proximally wide, purple, laterally with wide pale membranous margins, its white tip slightly hooded, lower side of corolla (actually in upper position) externally pubescent with reflexed-spreading white hairs over the purple somewhat inflated surface, internally glabrous, the midlobe forming a wide everted callose tip which is oil-yellow or else purple, the lateral lobes shorter and less callose; stamens 4, the anthers 2-celled but those of the shorter filaments smaller, the filaments all bearded; capsule 7 mm. long.

Lincoln County.

9. *CORDYLANTHUS KINGII* S. Wats., Bot. King's Expl. 1871.

Adenostegia kingii Greene.

Erect, branched, pubescent with glandular hairs; leaves 3-cleft,

segments linear; flowers in a loose simple spike, solitary and sessile in the axils of clasping bracts, which are 3-5 cleft and equaling the flower; bractlets none; calyx-leaves single and opposite to the bract, 2-3-toothed at the apex; stamens 4, with hairy filaments and 2-celled anthers, which are bearded at the base and apex.

Limestone ridge in Monitor Valley, Eureka and Lander Counties.

10. *CORDYLANTHUS HELLERI* (Ferris) J. F. Macbride, Contr. Gray Herb. 59:38. 1919.

Adenostegia kingii var. involucrata Kuntze; A. helleri Ferris.

Plant 1-3 dm. tall, erect, much-branched, the herbage softly grayish-pubescent with interspersed glandless and gland-tipped hairs; leaves linear or with a pair of divaricate linear lobes, the flowering bracts usually with 2-pairs of lobes and sometimes with 1 or 2 leaves subtending the abbreviated inflorescence, all segments linear and obtuse, often truncately so; calyx 22 mm. long, oblong, flattened from near the encircling base, distally with 2 acute teeth 1 mm. long; corolla 20 mm. long, its galea sagittally compressed, dorsally dark purple and hairy-striate but glabrous at the decurved apex, and with wide glabrous membranous margins, its lower lip with dark purple-striped moderately inflated pouch that is externally hirsute but internally glabrous, and with decurved glabrous purple minute lobes; stamens 4, the upper pair with somewhat smaller anthers, all the filaments bearded; capsule 6-7 mm. long.

Nye and Washoe Counties.

15. *ORTHOCARPUS* Nutt.

Gen. 2:56. 1818.

Annual herbs with erect (sometimes reclining) stems; leaves sessile, alternate, narrow, entire or pinnately lobed or parted; inflorescence spike-like, bracteate; calyx tubular-campanulate, 4-cleft or 2-cleft before and behind and the divisions 2-lobed; corolla tubular, narrow, extremely bilabiate, valvate, the erect galea scarcely surpassing (sometimes equal to or smaller than) the saccate, 3-toothed lower lip; stamens 4, filaments short, inserted near the summit of the tube; anthers 1- or 2-celled, then usually explanate and ciliate; capsule loculicidal; seeds few to many, reticulate or alveolate or with loose coat.

1. Lower lip of corolla 3-saccate; corolla 12-20 mm. long, white to yellow; leaves very narrowly linear-lanceolate. . . . 1. *O. HISPIDUS*

1. Lower lip of corolla uni-saccate; corolla 9-15 mm. long; leaves linear-lanceolate.

2. Bracts and calyces glandular-pubescent; corolla golden-yellow.

2. *O. LUTEUS*

2. Bracts and calyces puberulent, margins ciliate near the base;

corolla rose-purple, lower lip white. 3. O. COPELANDII

1. ORTHOCARPUS HISPIDUS Benth., Scroph. Indicae 13. 1835.

O. tenuis Heller; O. falcatus Eastw.; O. rarior Suksd.; Triphy-
saria hispida Rydb.; Orthocarpus hispidus var. tenuis Macb. and
Pays.

Herbage pubescent below becoming glandular and hirsute above; bracts
ovate, gradually changing from the leaves, becoming 3-7-lobed.

Open sites. Elko, Ormsby, Washoe and White Pine Counties.

2. ORTHOCARPUS LUTEUS Nutt., Gen. 2:57. 1818.

O. strictus Benth.

Herbage hispidulous and glandular; bracts 3-lobed, the central lobe
lance-ovate.

Open sites. Elko, Humboldt, Lander, Nye and Washoe Counties.

3. ORTHOCARPUS COPELANDII Eastw., Bot. Gaz. 41:288. 1906.

Herbage glabrous; bracts abruptly differing from upper leaves, with
a pair of short lobes at the base.

A. Corolla 12-15 mm. long; bracts 8-12 mm. long. . . . 3a. O. COPELANDII
var. TYPICUS

B. Corolla 10-12 mm. long; bracts 10-15 mm. long. . . . 3b. O. COPELANDII
var. CRYPTANTHUS

3a. ORTHOCARPUS COPELANDII var. TYPICUS Keck.

One specimen seen H. L. Mason, 12344, Washoe County.

3b. ORTHOCARPUS COPELANDII var. CRYPTANTHUS (Piper) Keck.

O. cryptanthus Piper.

One specimen seen, P. B. Kennedy, 1611, Washoe County.

16. PEDICULARIS (Bauhin) L.

Sp. Pl. 607. 1753.

Erect, ebracteolate perennial herbs (in ours) with alternate leaves
and a spike-like raceme of yellow, purple, red or white flowers; calyx
of 5, 4 or seemingly 2 lobes; corolla 2-lipped, the upper galeate and
extended, lower shorter with oblique lobes; stamens 4, didynamous; anthers

glabrous, their cells equal, obtuse to subulate-tipped; capsule flattened, glabrous, loculicidal; seeds several, often slightly winged.

1. Anther-cells subulate-tipped; stems less than 1 dm. tall; corolla 20-35 mm. long; seeds 4 mm. long.

2. Corolla 30-35 mm. long, lower lip dark-purple. .1. P. CENTRANTHERA

2. Corolla 15-25 mm. long, lower lip mostly yellow only the tip purple. 2. P. SEMIBARBATA

1. Anther-cells acute to obtuse; stems more than 1 dm. tall; corolla 6-10 mm. long; seeds 3 mm. long.

3. Inflorescence villose; beak of the galea 3-6 mm. long; calyx-lobes lance-linear. 3. P. ATTOLENS

3. Inflorescence glabrous; beak of galea 4-8 mm. long; calyx-lobes subulate. 4. P. GROENLANDICA

1. PEDICULARIS CENTRANTHERA Gray ex Torr. Bot. Mex. Bound. 120. 1859.
P. centranthera var. exulans M. E. Peck.

Glabrous plants (except loosely villose calyx-tubes), leaves exceeding the stems with 9-12 pairs of pinnules; petioles 3-6 cm. long.
Dry sites. Clark, Elko, Eureka, Lincoln, Washoe and White Pine Counties.

2. PEDICULARIS SEMIBARBATA Gray, Proc. Amer. Acad. 7:385. 1868.

Glabrous, except for the arachnoid-lanulose inflorescence; stem up to 1 dm. exceeded by the 9-12 paired, pinnulate leaves (15 cm.); petioles 3-4 cm. long; the upper pedicels 4-5 cm. long.

A. Corolla 15-20 mm. long; pinnules cut essentially to the midrib.
2a. P. SEMIBARBATA
var. TYPICA

B. Corolla 20-25 mm. long; pinnules not cut to the midrib, midportion of leaves relatively wider. 2b. P. SEMIBARBATA
var. CHARLESTONENSIS

2a. PEDICULARIS SEMIBARBATA var. TYPICA Gray

Inflorescence especially the calyces and pedicels arachnoid-lanulose; leaves exceeding the stem with 9-12 pairs of pinnules; petioles 3-4 cm. long.
Open sites. Clark, Douglas, Nye and Ormsby Counties.

- 2b. PEDICULARIS SEMIBARBATA var. CHARLESTONENSIS Pennell and Clokey in Clokey, So. Calif. Acad. Sci. Bull. 38:6. 1937.

P. semibarbata subsp. charlestonensis (Pennell and Clokey) Clokey, Madroño 8:60. 1945.

Endemic to the Charleston Mts., Clark County.

3. PEDICULARIS ATTOLENS Gray, Proc. Amer. Acad. 7:384. 1867.

Elephantella attolens Heller.

Glabrous except for the villose inflorescence; stem 3-4 dm. tall; leaves basal or almost so with about 12 pairs of pinnules, cut to the midrib.

Open sites. Ormsby and Washoe Counties.

4. PEDICULARIS GROENLANDICA Retz., Prod. Fl. Scand. ed 2. 145. 1795.

Elephantella groenlandica Rydb.

Glabrous throughout; stems 3-7 dm. tall; leaves basal or almost so, shorter than the stem, with 12-15 pairs of pinnules all cut to the midrib.

Open sites. Elko, Ormsby and Washoe Counties.

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